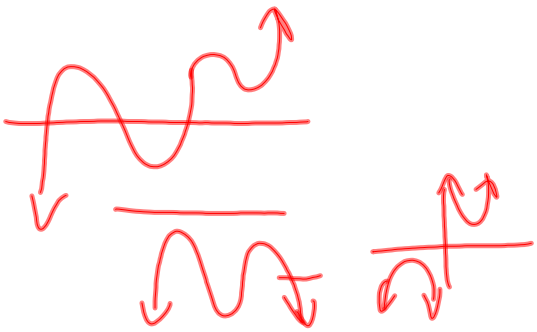
Warm Up
1. Sketch a graph of a polynomial function of degree 6, max # of turning points, with 4 real zeros and a negative leading coefficient.

2.Sketch a graph of a polynomial function of degree 5, max # of turning points, with 1 real zero and a positive leading coefficient.

38.
$2i$ $3i$
$-2i$ $-3i$
1
sum = 0
$p = 4$
$(x^2+4)(x^2+9)(x-1) = 0$
$(x^4+13x^2+36)(x-1)$
x^5+13x^3+36x
$-x^4-13x^2-36$
$x^5-x^4+13x^3-13x^2+36x-36=0$



7-6 Rational Zero Theorem

Solve, given that -4 is a zero.
$x^3 - 11x + 20 = 0$
-4

Rational Zero Theorem-- $\frac{p}{q}$ is a possible zero, where:

- p ∈ set of integral factors of the constant
- q ∈ set of the integral factors of the leading coefficient

Solve
$0 = 6x^3 + 7x^2 - 9x + 2$
$p \in \{\pm1, \pm2\}$
$q \in \{\pm1 \pm2 \pm3 \pm6\}$
$\frac{p}{q} \in \{\pm1 \pm\frac{1}{2}, \pm\frac{1}{3} \pm\frac{1}{6} \pm2 \pm\frac{2}{3}\}$

-2	6	7	-9	2
		-12	10	-2
	6	-5	1	0

$6x^2 - 5x + 1$
$6x^2 - 3x - 2x + 1$
$3x(2x-1) - 1(2x-1)$
$(3x-1)(2x-1) = 0$
$x = \frac{1}{3}$ $x = \frac{1}{2}$
$\{-2, \frac{1}{3}, \frac{1}{2}\}$

Solve
$x^4 - x^3 + 7x^2 - 9x - 18 = 0$

$p \in \{\pm1, \pm2, \pm3, \pm6, \pm9, \pm18\}$

$q \in \{\pm1\}$

$\frac{p}{q} \in$

$-1 \mid 1 \; -1 \; 7 \; -9 \; -18$
$\quad\quad -1 \; 2 \; -9 \; 18$
$2 \mid 1 \; -2 \; 9 \; -18 \; | \; 0$
$\quad\quad 2 \; 0 \; 18$
$\quad 1 \; 0 \; 9 \; | \; 0$

$x^2 + 9 = 0$
$x^2 = -9$
$x = \pm 3i$

$\{-1, 2, \pm 3i\}$

Do:
$0 = 2x^4 + 3x^3 + 6x^2 + 12x - 8$

Solve.
$0 = x^4 - 4x^3 + 6x^2 - 8x + 8$

$p \in \{\pm1, \pm2, \pm4, \pm8\}$

$q \in \{\pm1\}$

$\frac{p}{q} \in$

$2 \mid 1 \; -4 \; 6 \; -8 \; 8$
$\quad\quad 2 \; -4 \; 4 \; -8$
$2 \mid 1 \; -2 \; 2 \; -4 \; | \; 0$
$\quad\quad 2 \; 0 \; 4$
$\quad 1 \; 0 \; 2 \; | \; 0$

$x^2 + 2 = 0$
$x^2 = -2$
$x = \pm i\sqrt{2}$

$\{\pm i\sqrt{2}, 2\}$

Solve.
$0 = x^4 - 6x^3 + 8x^2 - 48x$

GCF

$0 = x(x^3 - 6x^2 + 8x - 48)$

$x = 0$

$p \in \{\pm1, \pm2, \pm3, \pm4, \pm6, \pm8, \pm12, \pm16, \pm24, \pm48\}$

$\{0, 6, \pm 2i\sqrt{2}\}$ $q \in \{\pm1\}$

$\frac{p}{q} \in$

HW
p381
13, 15, 19, 25, 28, 30